UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/609,396	07/01/2003	Jefferson YS Yang	MR2863-119	9361

4586 7590 04/25/2006

ROSENBERG, KLEIN & LEE
3458 ELLICOTT CENTER DRIVE-SUITE 101
ELLICOTT CITY, MD 21043

EXAMINER	
ONEILL, KARIE AMBER	
ART UNIT	**PAPER NUMBER**
1746	

DATE MAILED: 04/25/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/609,396	YANG ET AL.	
	Examiner	Art Unit	
	Karie O'Neill	1746	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *6-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *6-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6, 8, 10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rusta-Sellehy et al. (US 2003/0091876 A1) in view of Nagasawa et al. (US 4,988,283).

Rusta-Sellehy et al. discloses in Figure 1, a method for controlling a fuel cell system comprising a fuel cell stack, comprising the steps: (1) initiating a start-up for supplying the hydrogen to the fuel cell stack via a hydrogen line (11) and supplying an oxidant to the fuel cell stack via an oxidant line (3) (paragraph 0010); (2) detecting hydrogen pressure inside the hydrogen supply line with a pressure sensor (18) and; based on the detected hydrogen pressure, selectively opening/closing a hydrogen valve for controlling the hydrogen flow rate through the supply line (paragraph 0046). He also

discloses a step for opening the hydrogen valve for a given period of time in order to expel impure gases out of the fuel cell stack and the hydrogen supply line (paragraph 0053).

Rusta-Sellehy et al. does not disclose the method of controlling a fuel cell system which detects the output voltage and current of the fuel cell stack; and based on detected current, selectively driving an air pumping device, in a pulse width modulated manner, for controlling air flow rate through the air supply conduit line; and wherein the opening/closing operation of a hydrogen valve is done with a pulse signal; and further comprising shutting down the fuel cell system when the output voltage of the fuel cell stack is below a present safety threshold of output voltage.

Nagasawa et al. discloses a detecting means for detecting a voltage and a current of the fuel cell stack (column 2 lines 43-47) and based on the detected current the air supplied to the fuel cells can be automatically controlled (column 18 lines 30-32). Nagasawa et al. discloses the air supply device and opening/closing valve of the hydrogen supply line are pulse width modulated (column 2 lines 56-59). He also discloses a method of shutting down the fuel cell when the fuel cell stack is below a safety threshold output voltage (column 18 lines 32-36).

Rusta-Sellehy et al. and Nagasawa et al. are analogous art because they are from the same field of endeavor, fuel cells. At the time of the invention it would have been obvious to a person of ordinary skill in the art to combine the method steps of the Rusta-Sellehy et al. reference with the voltage a current detecting method steps of the Nagasawa et al. reference for the purpose of being able to easily control, through pulse

regulated signals, the air pump supply and hydrogen supply to the fuel cell stack and to increase or decrease the mount of current or voltage being supplied by or used by the fuel cell stack and to shut down the fuel cell if the safety parameters are threatened.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rusta-Sellehy et al. (US 2003/0091876 A1) and Nagasawa et al. (US 4,988,283) and in further view of Andou et al. (US 6,638,653 B2).

Rusta-Sellehy et al. and Nagasawa et al. disclose the method for controlling a fuel cell system in Claim 6 above, but do not disclose the method wherein the start-up comprises the steps of (a) opening the hydrogen valve to cause the hydrogen flow to the fuel cell stack; (b) actuating the air pumping device to supply a maximum flow rate of air to the fuel cell stack for a given period of time; and (c) controlling the air pumping device to supply air in a minimum air flow rate to the fuel cell stack.

Andou et al. discloses a fuel cell system to which fuel gas and oxidant gas are supplied to generate electricity; a fuel gas flow control valve controls the rate at which fuel gas is supplied to the fuel cell (column 5 lines 3-8); actuating the air compressor to supply a maximum flow rate of air (column 5 lines 47-50) for a predetermined period of time (column 6 lines 10-12); and controlling the air compressor to supply air in a minimum air flow rate to the fuel cell stack (column 6 lines 13-15).

Rusta-Sellehy et al., Nagasawa et al. and Andou et al. are analogous art because they are from the same field of endeavor, fuel cells. At the time of the invention it would have been obvious to one of ordinary skill in the art to incorporate into

the Rusta-Sellehy et al. and Nagasawa et al. fuel cell stack, the steps of controlling the maximum and minimum air flow rates, as in the Andou et al. reference, for the purpose of preventing the incomplete combustion of fuel gas due to lack of air flow and to prevent decreases cell voltage (Andou et al. column 6 lines 21-25).

Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rusta-Sellehy et al. (US 2003/0091876 A1) and Nagasawa et al. (US 4,988,283) and in further view of Kobayashi et al. (US 2002/0146606 A1).

Rusta-Sellehy et al. and Nagasawa et al. disclose the method for controlling a fuel cell system in Claim 6 above, but do not disclose the method further comprising a step of controlling the temperature of the fuel cell stack within a preset range.

Kobayashi et al. discloses in paragraph 0086, the temperature of the fuel cell being operated in a range between 80° to 90° C.

Rusta-Sellehy et al., Nagasawa et al. and Kobayashi et al. are analogous art because they are from the same field of endeavor, fuel cells. At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the fuel cell stack of Rusta-Sellehy et al. and Nagasawa et al. with a preset temperature range, as in the Kobayashi et al. reference for the purpose of determining if the fuel cell is in optimal running condition for supplying air flow to the fuel cell stack without it having to be cooled down or warmed up before running.

Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rusta-Sellehy et al. (US 2003/0091876 A1) and Nagasawa et al. (US 4,988,283) and in further view of Knights et al. (US 6,500,572 B2).

Rusta-Sellehy et al. and Nagasawa et al. disclose the method for controlling a fuel cell system in Claim 6 above, but do not disclose the method of Claim 6 wherein the control of air flow rate comprises: (a) setting the air flow rate to a minimum level when an output current of the fuel cell stack is smaller than a lower limit; (b) setting the air flow rate to three times of a required level in accordance with the output current when the output current is greater than the lower limit but smaller than an upper limit; and (c) setting the air flow rate to a maximum level when the output current is greater than the upper limit, and; the method wherein the step of controlling the air pumping device in accordance with the output voltage of the fuel cell stack whereby when the output voltage is lower than a preset lower bound, the air pumping device is caused to provide air flow with a maximum air flow rate for a given period of time and then resumes a regular flow and at the same time, the hydrogen exhaust valve is opened for a given period of time and then shut down.

Knights et al. discloses the operation of the fuel cell with different current limits. When the performance of the fuel cell drops to a low limit, the flow controller is set to introduce a baseline level of 0.8% air into the fuel cell stack that would increase to a 4% level if the voltage drops to below a lower limit, which is three times a required limit of air (column 8 lines 35-40). He also discloses the method step of controlling the air pumping device in accordance with the output voltage of the fuel cell stack whereby the

output voltage is lower than a preset lower bound, the air pumping device supplies a maximum air flow of 4% to the fuel supply line for given period of time and then resumes a regular flow and maintains the voltage of the fuel cell (column 8 lines 35-67).

Rusta-Sellehy et al. and Nagasawa et al. and Knights et al. are analogous art because they are from the same field of endeavor, fuel cells. At the time of the invention it would have been obvious to one of ordinary skill in the art to incorporate into the Rusta-Sellehy et al. and Nagasawa et al. fuel cell stack, the method steps of controlling the air flow rate based upon the output current of the stack and the method of controlling the air compressor in accordance with the output voltage of the stack. The motivation for doing so would be to know if poisoning of the fuel cell is occurring due to a low output voltage and introducing the air flow and because the introduction of different air flow rates influences the current output of the fuel cell.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karie O'Neill whose telephone number is (571) 272-8614. The examiner can normally be reached on Monday through Friday from 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1414. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KAO

MICHAEL BARR
SUPERVISORY PATENT EXAMINER